

**United States Naval Academy  
Mechanical Engineering Department**

**EM463 Reactor Physics II**

**Catalog Description:** EM463 Reactor Physics II

**Credit:** 3 (2-2-3)

The topics covered include neutron generation times, reactor period, delayed neutrons, negative temperature coefficient, xenon poisoning, control rod theory, shielding and a reactor kinetics case problem

**Prerequisites:** EM362

**Corequisites:** none

**Textbooks:** Glasstone and Sesonske, Nuclear Reactor Engineering, fourth edition, volume one, Chapman and Hall

**Course Director:** Prof. Martin E. Nelson

**Objectives<sup>1</sup>:**

1. To teach basic principles of reactor analysis (a,b,c)
2. To teach nuclear instrumentation and data analysis techniques (a,b,c)

**Course Content:**

No.	Topic or Subtopic	hrs.
1	Reflected reactors	2
2	Multi-group theory and Analysis	4
3	Heterogeneous reactors	2
4	Reactor kinetics	6
5	Control rod theory	5
6	Temperature coefficients	4
7	Fission product poisoning	4
8	Fuel isotopic changes	2
9	Reactor shielding	4
10	Health Physics and Statistics	4
11	Measurement of multiplication factor and migration area	8
12	Neutron activation analysis	6
13	Alpha spectroscopy, liquid scintillation counting	4

**Evaluation:**

1. Quizzes
2. Homework
3. Exams
4. Laboratory Reports

**Acquired Abilities<sup>2</sup>:**

- 1.1 Students will acquire ability to perform transient nuclear reactor analysis (1,2,3)
- 1.2 Students will acquire ability to perform multi-group heterogeneous reactor analysis (1,2,3)
- 1.3 Students will demonstrate the ability to use modern nuclear instruments and data analysis and acquisition systems (1,2,3,7)
- 1.4 Students will acquire ability to understand basic health physics and shielding considerations for a nuclear system (1,2,3,6).

**Date of Latest Revision:** 22 Oct 2001

<sup>1</sup> Letters in parenthesis refer to the [Program Objectives](#) of the [Mechanical Engineering Program](#).

<sup>2</sup> Numbers in parenthesis refer to the evaluation methods used to assess student performance.